A.D. 1864, *22nd September.* N° 2329.

SPECIFICATION

OF

THOMAS WALKER
AND
THOMAS FERDINAND WALKER.

UTILIZING SEWAGE.

LONDON:
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1865.

A.D. 1864, *22nd September.* N° 2329.

Utilizing Sewage.

LETTERS PATENT to Thomas Walker and Thomas Ferdinand Walker, both of Birmingham, in the County of Warwick, Engineers, for the Invention of "IMPROVEMENTS IN MEANS OR APPARATUS FOR THE UTILIZATION OF SEWAGE MATTERS, PART OF WHICH IMPROVEMENTS IS APPLICABLE TO RAISING AND FORCING OTHER FLUIDS."

Sealed the 17th March 1865, and dated the 22nd September 1864.

PROVISIONAL SPECIFICATION left by the said Thomas Walker and Thomas Ferdinand Walker at the Office of the Commissioners of Patents, with their Petition, on the 22nd September 1864.

We, THOMAS WALKER and THOMAS FERDINAND WALKER, both of Birmingham, in the County of Warwick, Engineers, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN MEANS OR APPARATUS FOR THE UTILIZATION OF SEWAGE MATTERS, PART OF WHICH IMPROVEMENTS IS APPLICABLE TO RAISING AND FORCING OTHER FLUIDS," to be as follows:—

The improvements apply particularly to when the sewage matters are collected in reservoirs in order that the more fluid portions thereof may be separated from the more solid by subsidence, and the object of the first part of the Invention is, first, to separate the heavier solid matters and the loose fibrous matters by causing the sewage matters, in passing into the subsiding

reservoir, to pass through a trough, by which the heavier solid matters may be arrested, whilst light bodies in suspension, such as paper, rags, and fibrous matters, will pass over the wall forming one side of the trough, and will be intercepted by a grating provided for that purpose. Corks and other light floating matters are detained in this trough by a screen, under which the sewage passes on its way to the settling pit or reservoir; this trough may be formed with inclined ends, up which may be drawn scrapers or other suitable cleansers for clearing the trough of the matters collected therein. The more liquid portion of the sewage matters is received from the trough into one end of a settling pit or reservoir, the bottom of which inclines to a central gutter, by which the drawing off of the more solid matters therefrom is facilitated. These settling pits or reservoirs we prefer to be arranged in pairs, so that one may be receiving the matters for subsidence whilst the matters subsided are being withdrawn from the other. The more solid matters may be withdrawn by pumping apparatus such as that described in the Specification of Letters Patent granted to me, the said Thomas Walker, bearing date the 21st day of November 1862, No. 3132, or by other suitable means. The more fluid portion of the matters passing from the surface of the settling pit or subsiding reservoir is allowed to overflow at the opposite end into a gutter or reservoir, and is thence, by pumping apparatus, raised or forced into other elevated reservoirs or feeders, from which, by suitable conduits, it may be conveyed for irrigating purposes to the districts desired.

The improvements relate, secondly, to pumping apparatus of the character of that described in the said former Specification as particularly adapted to the pumping of sewage matters, in which, in place of the sewage matters acted upon coming in contact with the piston, there is a diaphragm of flexible material to act on the sewage matters, and water or other suitable fluid intervening between the diaphragm and the piston.

We have found, when employing material for the diaphragm which resists the passage through it of liquid matters, that such diaphragm is liable to become injured, either when there is too little or too much water or other fluid between such diaphragm and the piston; and an object of this part of the improvements is to govern the quantity of water or other fluid so applied. For this purpose we apply, in connection with the chamber, between the diaphragm and the piston, two taps or valves, one of which is acted upon by the diaphragm when there is an excess of fluid between such diaphragm and the piston to admit of an escape of a portion thereof, and the other is acted upon by the diaphragm when there is too little fluid between it and the piston to admit of a further supply thereto from a suitable reservoir. These taps or

valves may be weighted to facilitate their closing again after being opened; or in place of two taps and valves a double passage slide combined with a pair of valves may be employed.

The improvements also relate to means of applying diaphragms to such pumps in order to their ready removal or replacement when required; for this purpose in some cases we apply the material of which the diaphragm is composed to a metallic rim or frame, formed in parts, connected by hinge joints to admit of its being readily reduced in size, and thereby to facilitate its ready introduction to or removal from the pump, and we apply an edging to it, of india-rubber or other suitable material, to effect a close packing, and we form the part of the pump with grooves to receive the diaphragm, and an opening for its admission closed by a cover. The diaphragm may be of the form of a bottle or other hollow vessel composed of india-rubber or other suitable flexible material capable of expansion and contraction, or opening and closing. Pumping apparatus thus arranged is applicable to raising and forcing other fluids.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Thomas Walker and Thomas Ferdinand Walker in the Great Seal Patent Office on the 22nd March 1865.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, THOMAS WALKER and THOMAS FERDINAND WALKER, both of Birmingham, in the County of Warwick, Engineers, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-second day of September, in the year of our Lord One thousand eight hundred and sixty-four, in the twenty-eighth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said Thomas Walker and Thomas Ferdinand Walker, Her special licence that we, the said Thomas Walker and Thomas Ferdinand Walker, our executors, administrators, and assigns, or such others as we, the said Thomas Walker and Thomas Ferdinand Walker, our executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN MEANS OR APPARATUS FOR THE UTILIZATION OF SEWAGE MATTERS, PART OF WHICH IMPFOVEMENTS IS APPLICABLE TO RAISING AND FORCING OTHER

Fluids," upon the condition (amongst others) that we, the said Thomas Walker and Thomas Ferdinand Walker, our executors or administrators, by an instrument in writing under our or their hands and seals, or under the hand and seal of one of us or them, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Thomas Walker, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say:—

The improvements apply particularly to when the sewage matters are collected in reservoirs in order that the more fluid portions thereof may be separated from the more solid by subsidence, and the object of the first part of the Invention is, first, to separate the heavier solid matters and the loose fibrous matters by causing the sewage matters, in passing into the subsiding reservoir, to pass through a trough, by which the heavier solid matters may be arrested, whilst light bodies in suspension, such as paper, rags, and fibrous matters, will pass over the wall forming one side of the trough, and will be intercepted by a grating provided for that purpose. Corks and other light floating matters are detained in this trough by a screen, under which the sewage passes on its way to the settling pit or reservoir; this trough may be formed with inclined ends, up which may be drawn scrapers or other suitable cleansers for clearing the trough of the matters collected therein. The more liquid portion of the sewage matters is received from the trough into one end of a settling pit or reservoir, the bottom of which inclines to a central gutter, by which the drawing off of the more solid matters therefrom is facilitated. These settling pits or reservoirs may be arranged in pairs, so that one may be receiving the matters for subsidence whilst the matters subsided are being withdrawn from the other. The more fluid portion of the matters passing from the surface of the settling pit or subsiding reservoir is allowed to overflow at the opposite end into a gutter or reservoir, and is thence, by pumping apparatus, raised or forced into other elevated reservoirs or feeders, from which, by suitable conduits, it may be conveyed for irrigating purposes to the districts desired.

The improvements relate, secondly, to pumping apparatus of the character of that described in the Specification of Letters Patent granted to me, the said Thomas Walker, bearing date the 21st day of November 1862,

T. & T. F. Walker's Improvements in Apparatus for the Utilization of Sewage.

No. 3132, as particularly adapted to the pumping of sewage matters, in which, in place of the sewage matters acted upon coming in contact with the piston, there is a diaphragm of flexible material to act on the sewage matters, and water or other suitable fluid intervening between the diaphragm and the piston.

We have found, when employing material for the diaphragm which resists the passage through it of liquid matters, that such diaphragm is liable to become injured either when there is too little or too much water or other fluid between such diaphragm and the piston; and an object of this part of the improvements is to govern the quantity of water or other fluid so applied. For this purpose we apply, in connection with the chamber, between the diaphragm and the piston, two taps or valves, one of which is acted upon by the diaphragm when there is an excess of fluid between such diaphragm and the piston to admit of an escape of a portion thereof, and the other is acted upon by the diaphragm when there is too little fluid between it and the piston to admit of a further supply thereto from a suitable reservoir. These taps or valves may be weighted to facilitate their closing again after being opened; or in place of two taps and valves a double passage slide combined with a pair of valves may be employed.

The improvements also relate to means of applying diaphragms to such pumps in order to their ready removal or replacement when required; for this purpose in some cases we apply the material of which the diaphragm is composed to a metallic rim or frame, formed in parts connected by hinge joints to admit of its being readily reduced in size, and thereby to facilitate its ready introduction to or removal from the pump, and we apply an edging to it, of india-rubber or other suitable material, to effect a close packing, and we form the part of the pump with grooves to receive the diaphragm, and an opening for its admission closed by a cover.

But that the Invention may be fully understood we will, by the aid of the accompanying Drawings, proceed to describe means pursued by us.

Description of the Drawings.

Figure 1 shows a plan view, Figure 2 a longitudinal section, and Figure 3 a transverse section of apparatus arranged according to the first part of the Invention.

a is a conduit by which the sewage matters are conducted into the trough *b*, there being passages a^1, a^1, between the conduit *a* and the trough *b* by which the sewage matters may freely pass from the conduit *a* to the trough *b* at various distances of its length, and these passages a^1, a^1, are below the surface

of the sewage matter, and thereby they serve to trap the outlets of the drains, and prevent the return of foul smells up the drains.

The heavier solid matters contained in the sewage matter will be arrested in the reservoir *b*, and sink to the bottom thereof, whilst the light bodies in suspension, such as paper, rags, and other fibrous matters, will pass with the more liquid portion of the sewage matters over the wall b^1, forming one side of the trough *b*, and such light bodies in suspension will then be intercepted by the horizontal grating *c*, which may be continued vertically up the wall c^1 if desired. b^2 is a screen by which corks and other light floating matters are detained in the trough *b*, but which admits of the sewage passing under it over the wall b^1 on its way through the grating *c* to the settling pit or reservoir *d*; b^4 is bridge over the wall b^1.

The trough *b* is, by preference, formed with inclined ends b^3, b^3, to facilitate the removal from the bottom thereof of the matters collected therein by means of scrapers or other suitable cleansers. A form of scraper suitable for the purpose is shewn at *e* attached to a chain, or it may be a rope or a rod e^1 operated by a winch or by other suitable means, and thence the matters may be delivered into trucks, boats, or other receivers to be conveyed away.

The more liquid portion of the sewage matters as it passes from the trough *b* is received in at the end d^1 of the pit or reservoir *d*, and the bottom d^2 of this pit or reservoir *d* is inclined to the central gutter d^3 to facilitate the collecting and drawng off therefrom of the more solid portion of the sewage matters formed by settling or subsidence in this pit or reservoir. The gutter d^3 is also inclined to one end of it, where it communicates by a suitable channel with a well or receiver. These settling pits or reservoirs may be arranged in pairs, so that one of them may be receiving matters for subsidence, whilst the matters subsided are being withdrawn from the other.

The more solid matters collected by subsidence in the reservoirs *d* may be withdrawn therefrom or from the receiving well from such reservoir by pumping apparatus such as that described in the Specification of the Patent before referred to, or such as that herein explained, or by other suitable means. The more fluid portion of the sewage matters will flow from the surface of the settling pits or subsiding reservoirs *d* into the gutter *f*, from which it is raised or forced by suitable pumping apparatus into elevated reservoirs or feeders, from which by suitable conduits it may be conveyed for irrigating purposes to the districts desired.

Figure 4 shows an external view, Figure 5 a vertical section, and Figure 6

a plan of apparatus arranged according to the second part of our Invention; Figures 7, 8, 9, 10, 11, 12, 13, and 14 show portions thereof separately. *g* is the flexible diaphragm, one surface of which is acted upon by the sewage matters rising into the lower chamber *h* through the opening *i*, which is capable of being closed by the valve i^1, and the other surface of this diaphragm *g* is acted upon by the water or other fluid in the chamber h^1, between it and the piston *j*; *k* is the passage by which the sewage matters are driven off from the chamber *h*.

When employing material for the diaphragm *g* which resists the passage through it of liquid matters, and which is thereby liable to become injured when there is either too little or too much water or other fluid between such diaphragm and the piston *j*, we employ taps or valves to govern the supply of such water or other fluid.

According to the arrangement shewn, we apply to the flexible diaphragm *g* plates *o*, so as to connect such diaphragm *g* to one end of the chain *p*, the other end of which is connected to one end of the lever *q*, which turns upon a shaft q^1, and at its other end this lever is connected to and so as to be capable of actuatiug the sliding plate *r*, which is capable of sliding in the chamber *s*, and is formed with holes r^1, r^2, through it, which are capable respectively of being closed by the valves r^3 and r^4. The weight of the lever *q* is counteracted by another lever arm q^2 fixed on the shaft q^1 externally of the apparatus. When there is a tendency to excess of water or other fluid between the diaphragm *g* and the piston *j*, the diaphragm *g* will draw down the chain *p* and the lever *q*, thereby drawing the plate *r* so as to bring the hole r^1 in communication with the chamber h^1, and then such water or other fluid may pass away by the pipe *t* to a suitable reservoir. When there is too little water or other fluid in the chamber h^1, the diaphragm *g* will raise the lever *q*, thereby moving the plate *r* so that the hole r^2 thereof will be open to the pipe *t*, and water or other fluid will be drawn into the chamber h^1 by the passage r^5.

We by preference apply the diaphragms *g* to frames *l*, each of which is formed in parts which are connected together by pin joints l^1, so that the sides thereof may readily be inclined towards each other, as indicated by the dotted lines in Figure 7, and we apply such frame by passing it into a groove formed for it in the pump barrel through an opening closed by the cover *u*.

The diaphragm may be of the form of a bottle or other hollow vessel composed of india-rubber or other suitable flexible material capable of expansion

and contraction, or opening and closing. Pumping apparatus thus arranged is applicable to raising and forcing other fluids.

In witness whereof, I, the said Thomas Walker, have hereunto set my hand and seal, this Twenty-second day of March, in the year of our Lord One thousand eight hundred and sixty-five.

THOS. WALKER. (L.S.)

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1865.

A. D. 1864. Sep. 22. Nº 2329.
T. & T. F. WALKER'S Specification.

FIG. 1.

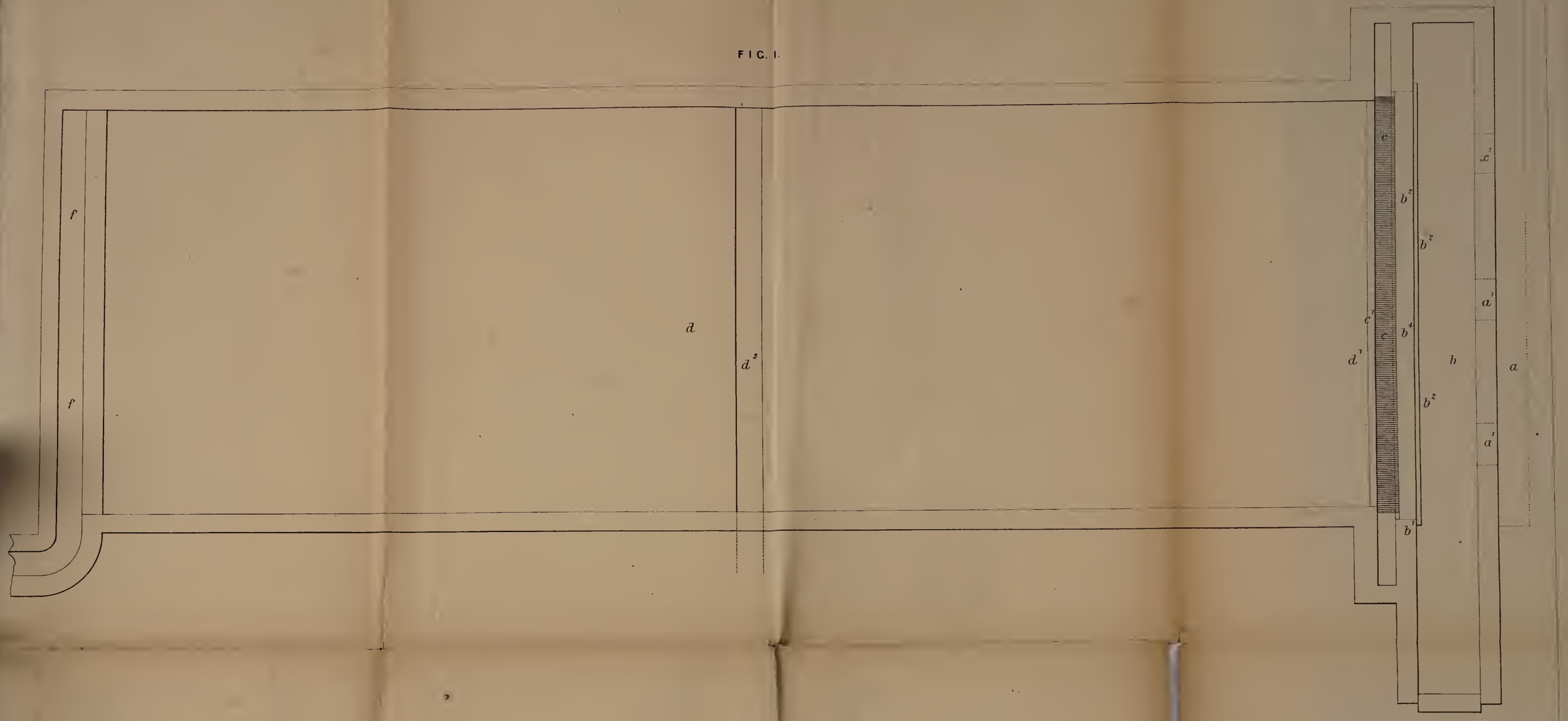


FIG 2.

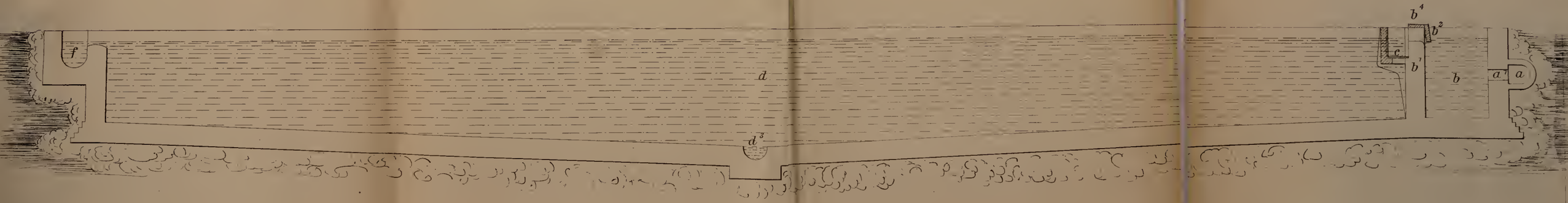
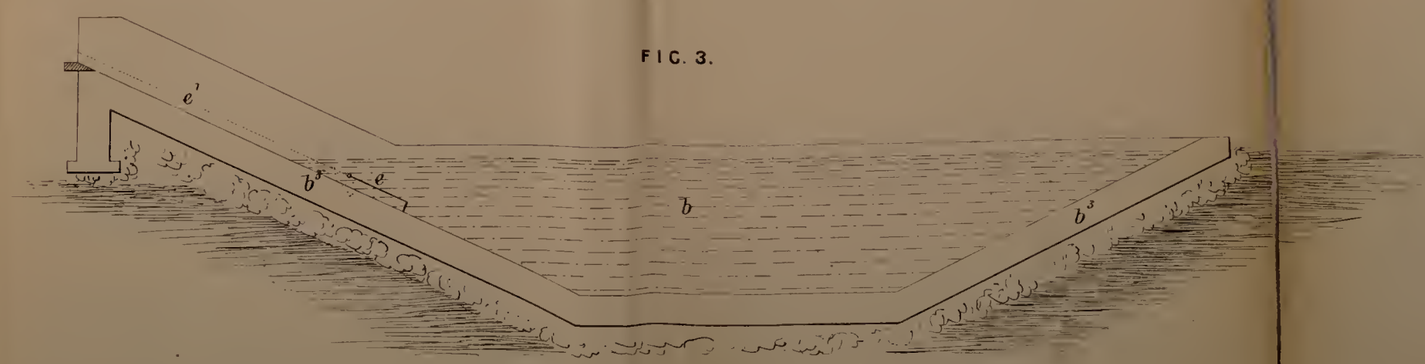


FIG. 3.



The filed drawing is colored.

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FIG. 5.

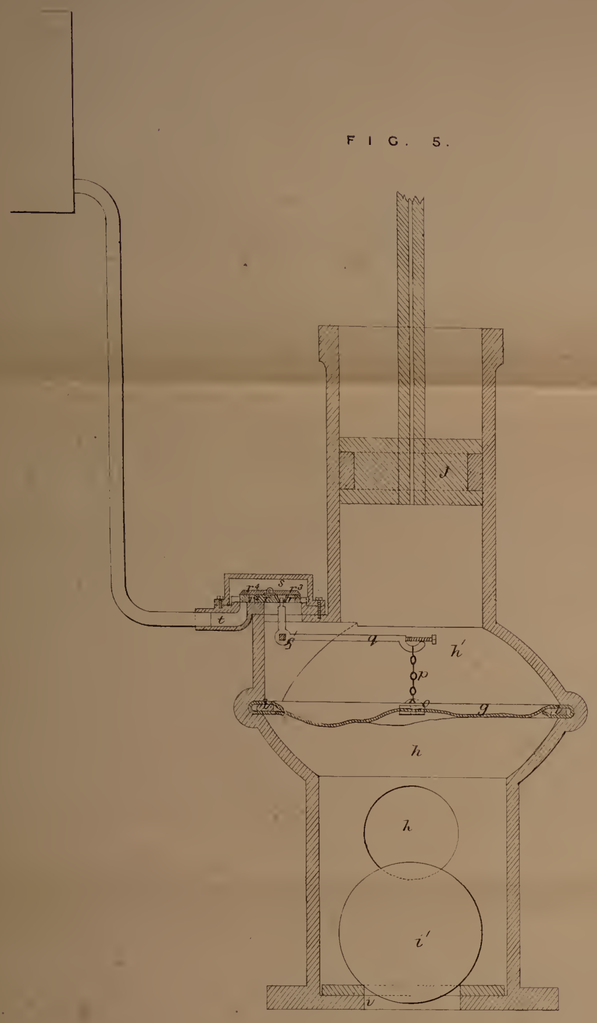


FIG. 7.

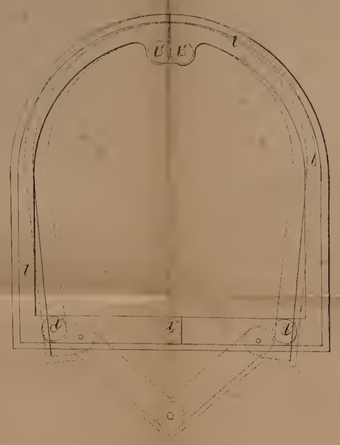


FIG. 8.

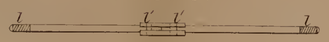


FIG. 9.

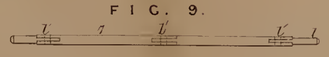


FIG. 4.

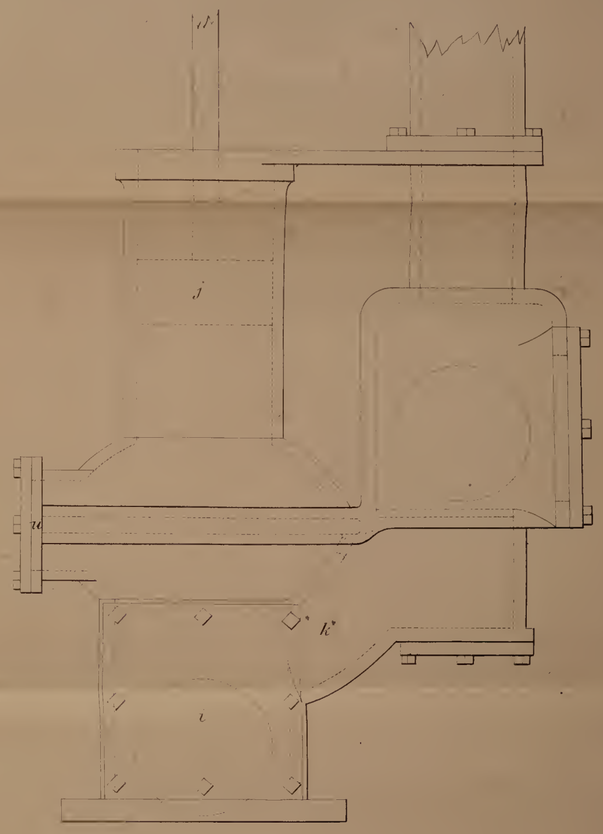


FIG. 10.

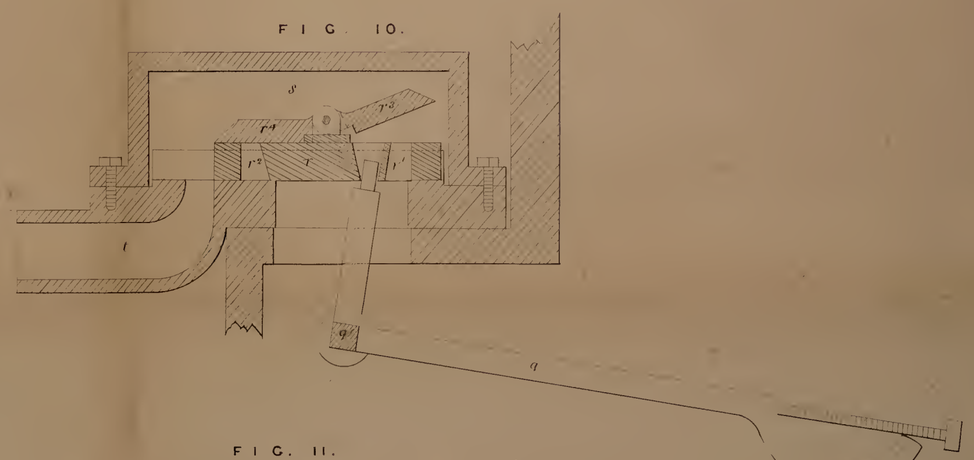


FIG. 11.

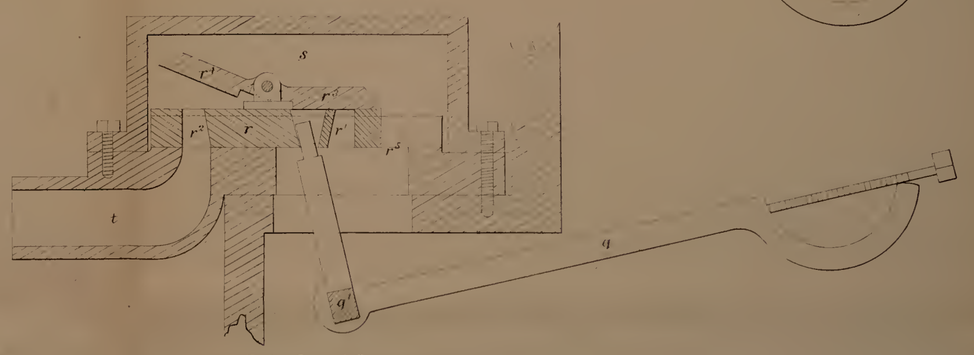


FIG. 6.

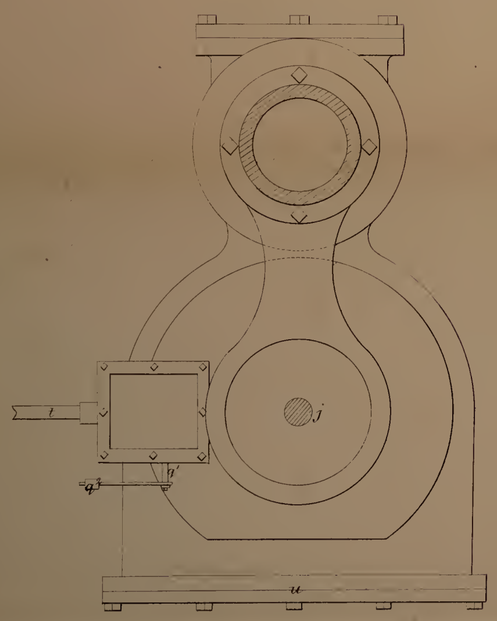


FIG. 12.

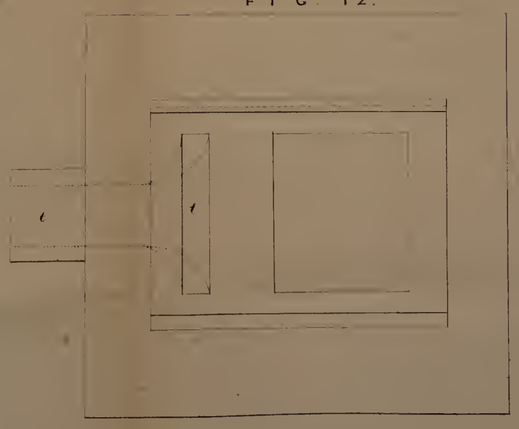


FIG. 13.

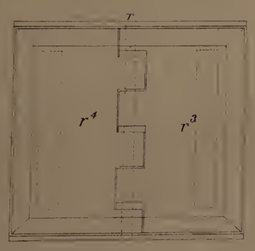
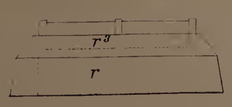


FIG. 14.



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